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ABSORBENT PRODUCTS

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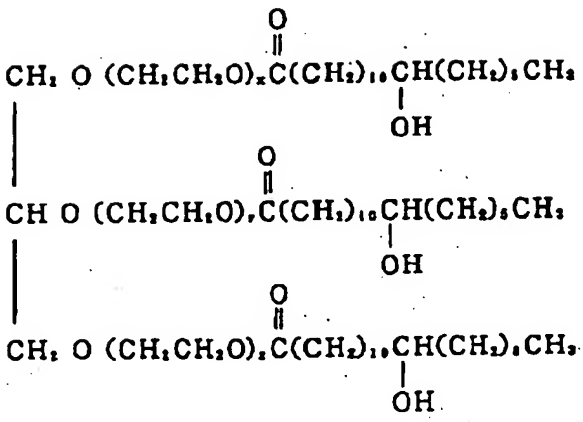
Abstract (Modified)

Objective

Absorbent products such as sanitary napkins, paper diapers, etc., having long-lasting hydrophilic property and less skin irritation and causing no yellowing are to be provided.

Configuration

Absorbent products comprising a hydrophilic polyolefin nonwoven fabric with a castor oil conductor derived from the following formula, and adhered to a perforated polyolefin film.

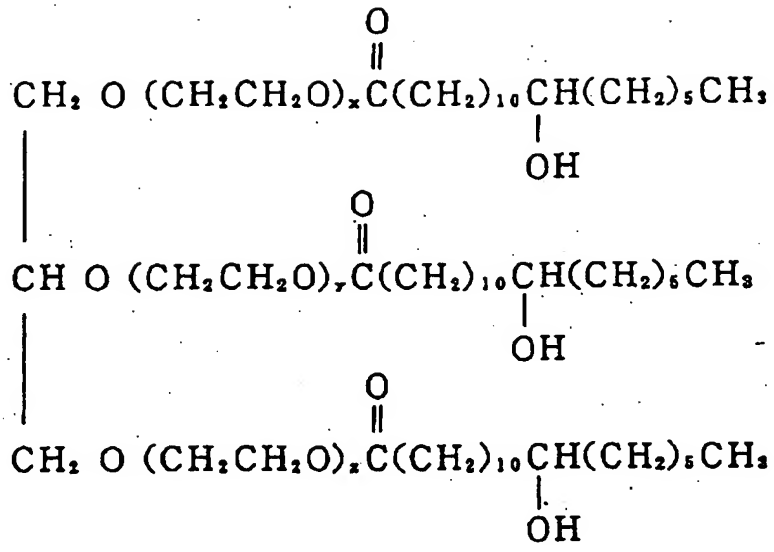


(In the formula, x + y + z =10 to 60.)

Claims

1. Absorbent products characterized by a hydrophilic material comprising a polyolefin nonwoven fabric and a castor oil derivative of the following formula, and a hydrophilic material consisting of a perforated polyolefin film.

[Structure 1]



(In the formula, x + y + z = 10-60)

2. The absorbent materials of Claim 1, wherein the hydrophilic material is used as a surface material on the absorbent materials comprising an absorber and liquid-permeable surface material covering the absorber.

3. The absorbent materials of Claim 1 or 2, wherein the hydrophilic material is allowed to contain 0.5-10.0 wt% of the above castor oil derivative.

* * *

Detailed explanation of the invention

[0001]

Industrial application field

The present invention relates to an absorbent product. More specifically, it relates to a paper diaper, a sanitary napkin, and other absorbent products using a nonwoven fabric or a perforated polyolefin type of porous film using polyolefin composite fibers as a material.

[0002]

Prior art

To avoid the unpleasant feeling during the wearing of a paper diaper, a sanitary napkin, or the like due to perspiration, urine, body fluids, or the like, it is considered to be important to exhibit the wetting ease of these products in a short period of time, rather than the wetting ease of their surface material. Therefore, it is required that the polyolefin fibers and so on constituting the surface material absorb the liquid in a short period of time. At the same time, for the paper diaper and the like, a durable hydrophilicity (repeated-use hydrophilicity) is strongly required for wearing by an infant, an older person, a patient, and so on who cannot dispose of their own excrement, or to allow handling of excrement released several times in one wearing due by increasing in the absorption capacity and improving leakage

prevention. Furthermore, attempts have recently been made to blend or laminate the hydrophilically treated polyolefin fibers in cellulose pulp to improve the absorption performance of the absorbent. A durable hydrophilicity is also strongly required for such a use. Furthermore, it is also required to increase the hydrophilicity beyond this and to render a durable hydrophilicity without hindering the absorption property of hydrophilic base materials like wood pulp, viscose rayon, vinylon, etc.

[0003]

Conventionally, as technological methods used to confer hydrophilicity on the base materials mentioned previously, methods (1) through (4) following are known.

(1) A method for kneading a hydrophilicity-conferring agent into a hydrophobic resin and for obtaining a hydrophilic fiber aggregate from spun fibers. As such a method, there is one for the manufacture of hydrophilic microfine fibers with a long fiber length from a multicomponent type of mixed polymer having no miscibility; in particular, a method for the manufacture of fibers after mixing polyethylene glycol in a polymer followed by melt kneading (Japanese Kokai Patent Application No. Sho 49[1974]-529), a method for the addition of a surfactant to a polyolefin, with the thermal formation of a porous film, followed by a corona discharge treatment (Japanese Kokoku Patent No. Hei 1[1989]-49381), or the like.

(2) A method for the adherence of a hydrophilic low-molecular-weight compound (a surfactant). As such a method, there is a method for adhering polyolefin fibers and a fatty

acid ester type of nonionic surfactant with a high affinity (Japanese Kokai Patent Application No. Sho 63[1988]-6166), a method using a polyglycerin fatty acid ester (Japanese Kokai Patent Application No. Hei 2[1990]-216265), or the like.
(3) A method for carrying out the plasma treatment, corona treatment, or other physical treatments. There is a method for the carbonylation of the surface by treatment due to the excitation of oxygen with high-frequency energy under reduced pressure (Japanese Kokoku Patent No. Sho 53[1978]-794).
(4) Chemical treatment, solvent treatment, and other chemical treating methods.

[0004]

Problems to be solved by the invention

However, in method (1), the amount of the surfactant added has a major effect on the processing characteristics, as well as the performance after bleed-out. Furthermore, in the case of kneading a conventionally used compound, yellowing of the resin will also occur. In addition, method (2) is simple and convenient, but the wetting of the adhering agent on the fiber surface is poor. Not only can the expected liquid penetration characteristics not be obtained, but also durability cannot be achieved even if the liquid penetration characteristics are obtained to some extent. Furthermore, there is a disadvantage in that they are mostly substances with a high level of skin irritation. For (3) and (4) which can achieve good results to a certain extent with regard to skin irritation or liquid penetration, due to a temporal change in the polar groups

occurring due to modification, the hydrophilicity will easily deteriorates over time. Furthermore, since a large amount of heat or electricity is required in this modification, it will not be economical. Therefore, the present invention has the objective of providing an absorbent product having a durable hydrophilicity, a low skin irritation level, and no occurrence of yellowing.

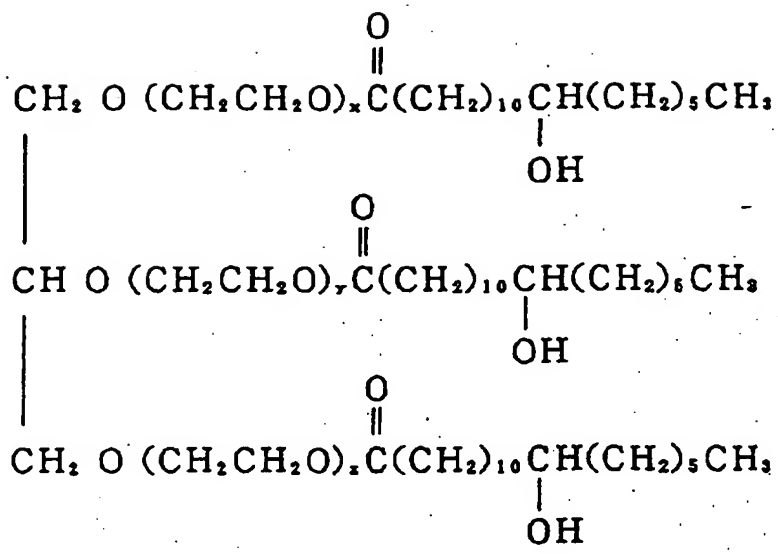
[0005]

Means to solve the problems

The present invention has achieved the previously mentioned objective by providing an absorbent product characterized by the fact that it is provided with a hydrophilic material consisting of a polyolefin nonwoven fabric and polyolefin porous film adhered with a hardened castor oil derivative shown by the general formula of Structure 2 following.

[0006]

[Structure 2]



(where x + y + z = 10-60).

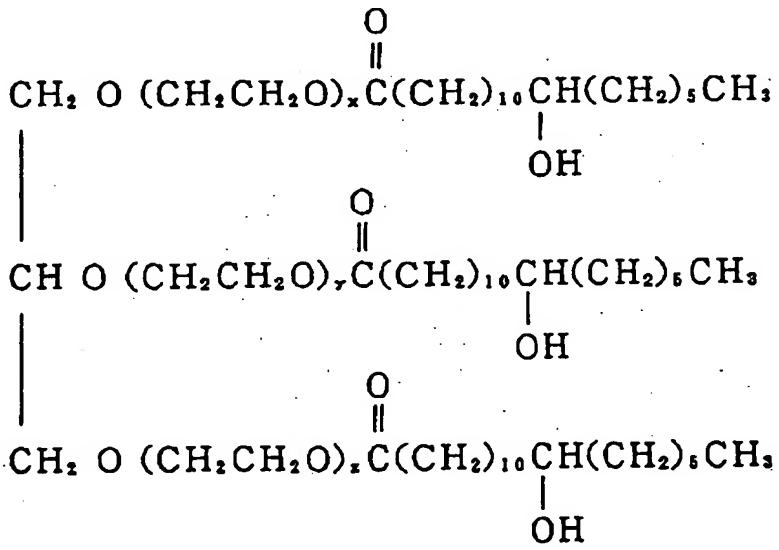
Furthermore, it is desirable that the hydrophilic material mentioned previously is used in the surface material of an absorbent product having an absorbent body and that a liquid-permeable surface material covers the surface of said absorbent body.

[0007]

Along with a figure in the following, the preferred embodiment of the present invention will be described in detail. Figure 1 is a partial cutaway isometric diagram of a sanitary napkin as an embodiment of an absorbent product related to the present invention. Figure 1 shows the application embodiment of the preferred sanitary napkin. The absorbent product (1) used as the sanitary napkin consists of a liquid-permeable surface material (2), a liquid-impermeable leak-preventing material (3), and an absorbent body (4) provided between them. However, the surface material (2) is a hydrophilic material consisting of a polyolefin nonwoven fabric or polyolefin porous film adhered with a hardened castor oil derivative shown by the general formula of structure 3 following.

[0008]

[Structure 3]



(where x + y + z = 10-60)

[0009]

For the previously mentioned derivative of the surfactant, hydrophilicity is rendered to the previously mentioned polyolefin nonwoven fabric or polyolefin porous film. It is desirable that this is contained at 0.5-10.0 wt%, preferably 1.0-5.0 wt%, with respect to the polyolefin nonwoven fabric or the polyolefin porous film mentioned previously. If it is less than 0.5 wt%, the effect as a surfactant cannot be effectively exhibited. If it exceeds 10.0 wt%, yarn spinning and film-forming characteristics will be poor.

[0010]

Furthermore, the hardened castor oil derivative is a compound with the sum of x + y + z = 10-60, preferably 10-20. If this value is less than 10, a sufficient hydrophilicity cannot be obtained. Furthermore, since the molecular weight is small, the heat resistance is poor. During the preparation of fibers or films, decomposition, smoking, and resin yellowing will occur. In consideration of the heat resistance, it is better for the molecular weight to be high. If x + y + z is greater than 60, the bleed-out level is small and the performance cannot be enhanced. The range mentioned previously is desired since it is necessary for this to be miscible in the polyolefin resin to the extent that these values do not lower the processing characteristics, for the bleed-out to proceed simultaneously over time, and for the surface-active layer to be formed. This

derivative has the advantage that its toxicity is low since it is added together with a chemical, in addition to its use as an emulsifier of the ester for the softening treatment of tire cords, nylon fibers, etc.

[0011]

As a method for containing the hardened castor oil derivative, it is acceptable to add the previously mentioned derivative prior to the formation of the film or to form a master batch with the previously mentioned polyolefin resin beforehand, to blend the resin at the specified amount. Furthermore, it is also acceptable that, if necessary, the previously mentioned derivative is appropriately adhered on the nonwoven fabric or the porous film.

[0012]

The polyolefin porous film is identical to a film in a net shape or the steric state used in the surface material of the ordinary absorbent product. As the base materials of the polyolefin porous films, polyethylene, polypropylene, their copolymers, and so on can be mentioned. In particular, polyethylene is preferred with respect to its feel, cost, etc. Furthermore, the state having a perforated portion for the polyolefin film is required for water penetration. It is especially preferred that the perforations of such a film are in a steric state for preventing return of the absorbed liquid to the body side. It is preferable that the thickness of the effective film is 20-1000 μm, especially 300-700 μm.

skin. The hydrophilic material mentioned previously is especially appropriate as the liquid-permeable surface material covering the surface of the absorbent body. However, it is not restricted to this. The woven materials, nonwoven fabrics, and so on used in the absorbent bodies of the absorbent products are acceptable. Nonwoven fabrics are preferred. In this case, during the manufacture of said absorbent products, the control of the hydrophilicity of said absorbent body can be easily achieved.

[0015]

Application examples

Application Examples 1 and 2

1. A hardened castor oil derivative (x + y + z = 10) was added at 10 wt% with respect to polyethylene. After premixing with a pelletizer, it was kneaded with a biaxial kneading machine to make a master batch. A base resin was added to the master batch. They were mixed by the dry blending method. The amount of addition was set at 5 wt%. Using the resin obtained, a porous film having a thickness of 600 μm was prepared.

2. In composite fibers with polyethylene terephthalate as the core and polyethylene as the sheath, 2 wt% of the hardened castor oil derivative (x + y + z = 10) with respect to the sheath component were kneaded and spun into yarns with a size of 3d. The fibers obtained were cut to a length of 55 mm. The hydrophilic fibers obtained were made into a web form using a carding machine and heated at 140°C to obtain a nonwoven fabric.

The absorbent bodies of commercial napkins were wrapped with the hydrophilic film or nonwoven fabric obtained in Application Examples 1 and 2, to obtain samples for evaluation.

[0016]

Comparative Examples 1 through 4

1. With respect to a polyolefin porous film with a thickness of 600 μm, a polyoxyethylene lauric acid ester (EO 12 mol adduct) was coated in the amount of 0.05 g/m^2 on the resin surface.

2. With respect to a polyolefin porous film with a thickness of 600 μm, a polyoxyethylene lauryl ether sulfate (EO 3 mol adduct) was coated in the amount of 0.05 g/m^2 on the resin surface.

3. With respect to polyethylene, a polyoxyethylene lauric acid ester (EO 12 mol adduct) was added at 10 wt%. After premixing with a pelletizer, it was kneaded with a biaxial kneading machine to form a master batch. A base resin was added to the master batch. They were mixed by the dry blending method. The amount of addition was set at 5 wt%. Using the resin obtained, a porous film with a thickness of 600 μm was prepared.

4. For 3d composite fibers consisting of polyethylene terephthalate as the core and polyethylene as the sheath, polyoxyethylene lauryl ether sulfate (EO 3 mol adduct) at 0.3 wt% of the fiber weight was adhered. The fibers obtained were cut into a length of 55 mm. They were made into a web shape by using a carding machine and heated at 140°C to obtain a nonwoven fabric. With the sample obtained, in the same manner as

in the case of the application examples, the absorbent bodies of commercial napkins were wrapped to obtain the samples for evaluation. For these, the evaluation of absorption characteristics was carried out according to the test method in the following.

[0017]

Application Examples 3 and 4

3. A sample was prepared in the same manner as in Application Example 1, except that the hardened castor oil derivative ($x + y + z = 40$) was kneaded.

4. A sample was prepared in the same manner as in Application Example 1, except that the hardened castor oil derivative ($x + y + z = 60$) was kneaded. The samples obtained were wrapped around the absorbent bodies of commercial napkins to obtain samples for evaluation. For these, the evaluation of absorption characteristics was carried out by the test method shown in the following.

[0018]

Comparative Examples 5 through 7

5. A sample was prepared in the same manner as in Application Example 1, except that the hardened castor oil derivative ($x + y + z = 80$) was kneaded.

6. A nontreated film was used as a sample.

7. A nontreated nonwoven fabric was used as a sample. The samples obtained were wrapped around the absorbent bodies of commercial napkins, to obtain samples for evaluation. For these, the evaluation of absorption characteristics was carried out by the test methods shown in the following.

[0019]

Test methods

Glycerin liquid absorption time

A commercial napkin absorption body was wrapped with a test specimen and sandwiched between glass cylinders with an internal diameter of 35 mm, 5 cm^3 of a glycerin/water = 85/15 wt% solution were injected from above, and the time for the absorption of the entire liquid was measured.

Yellowing evaluation method

A sample was placed in a "fadeometer" and stored at 63°C. The manner of yellowing over time was visually observed. One without yellowing at all observed after irradiation for 78 h was denoted by ⓞ. One with essentially no yellowing observed was denoted by O. One with yellowing observed in a short period was denoted by X.

Evaluation of reabsorption characteristics

A test specimen cut to 50 mm x 50 mm was placed on a commercial napkin. The entire body was washed with 50 cc of ion-exchanged water. After the completion of washing (absorption), it was allowed to stand for 3 min and dried in an electrolytic dryer at 80°C. After sufficient drying, liquid droplets were released via a syringe. One with the deterioration of the absorption performance in comparison to that before washing was denoted by O. One causing a partial absorption hindrance was denoted by Δ. One showing no absorption characteristics at all was denoted by X.

[0020]

Table I

Sample		① 親水化剤	② 基材	③ 吸収時間	④ 黄変	⑤ 再吸収性
⑥ 実施例	1	K	Film	15″	○	○
	2	K	Non-woven	12″	◎	○
⑦ 比較例	1	POEL	Film	15″	×	×
	2	ES	Film	20″	×	×
	3	POEL	Film	21″	×	○
	4	ES	Non-woven	15″	◎	△
⑥ 実施例	3	K	Film	15″	○	○
	4	K	Film	29″	◎	△
⑦ 比較例	5	K	Film	45″	◎	×
	6	未処理品 ⑧	Film	50″	◎	×
	7	未処理品 ⑧	Non-woven	∞	◎	×

Key: 1 Hydrophilizing agent
2 Substrate
3 Absorption time
4 Yellowing
5 Reabsorption characteristics
6 Application example
7 Comparative examples
8 Nontreated product

K: Hardened castor oil derivative
POEL: Polyoxyethylene lauric acid ester (EO 12 mol adduct)
ES: Polyoxyethylene lauryl ether sulfate sodium salt (EO 3 mol adduct)

[0021]

Effects of the invention

The absorbent product related to the present invention has the so-called durable hydrophilicity, a low skin irritation level, and furthermore is free of the occurrence of yellowing.

Brief description of the figure

Figure 1

This is a partial cutaway isometric diagram of a sanitary napkin used as an application embodiment of the absorbent product related to the present invention.

Brief explanation of symbols

1 Absorbent product (sanitary napkin)
2 Surface material
3 Leakage-preventing material
4 Absorbent body

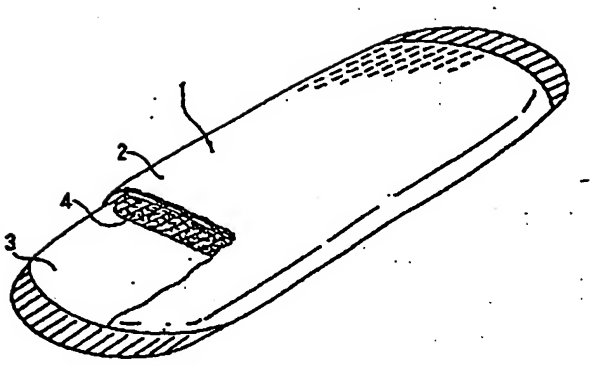


Figure 1